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ABSTRACT

A model for identifying gifted and talented students (grades K-12) is described. Characteristics of giftedness are seen to fall into three major clusters: cognitive and psychomotor capacities for acquiring fundamental skills and knowledge, creative problem-finding solving skills, and personal characteristics. Nineteen steps in implementing an identification program are outlined, and sample forms are provided (including a student interest survey, peer and adult nomination forms, a student self-assessment form, and rating scales). (CL)

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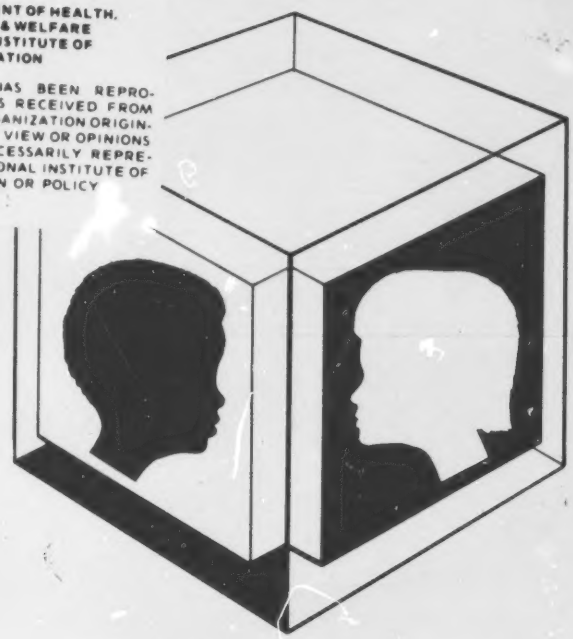

# Guidelines for the identification of the gifted and talented

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# FOREWORD

Identification of talented and/or gifted students in the school population is a basic and vital step. When they are identified and placed in appropriate programs, their accomplishments exceed both in quantity and quality, those of pupils from the general population. A significant percentage of our talented and gifted students currently do not have that opportunity for growth. In fact, in 1970, a national survey reported that 57.5 percent of the schools surveyed responded that they had NO gifted students. In New York State, a 1975 survey indicated similar findings.

While it is difficult to estimate the number of talented and/or gifted school age students in this State, it is recognized that they can be found. Figures range from a conservative 3 percent to 15 percent depending on the definition of talent and/or giftedness. The definition suggested by the U.S. Office of Education in its August 1971 report is:

> *Gifted and talented children are those identified by professionally qualified persons who, by virtue of outstanding abilities, are capable of high performance. These are children who require differentiated programs and/or services beyond those normally provided by the regular school program in order to realize their contribution to self and society.*

This broad definition must be further refined to reflect the multifaceted dimensions of their abilities. These dimensions include *demonstrated or potential* abilities in the following areas of human endeavor:

- academic work
- the visual and performing arts activities
- psychomotor activities
- psychosocial activities

The model presented in this publication provides a basis for further development of definitions which are both consistent and operational. This may be accomplished by systematically analyzing three major clusters of characteristics--aptitudes, creative thinking and expression, and personality related factors. Definitions of gifted, talented and potentially gifted are critical to both identification and programming.

It should be understood that the model is considered theoretical and the arrangement of overlapping circles is used as a visual presentation of possible relationships. The individual components have research validity via the numerous studies concerning aptitude, intelligence, achievement, creativity and personal characteristics. In addition, a relationship between intelligence as an aptitude and creativity has been clearly established through the work of Getzels, Jackson, Torrance and others, as has the relationship between achievement and motivation. However, the applicability of the model to areas of human endeavor other than academic has not been established. Hopefully, those who use the model to define terms and develop identification and instructional programs will provide feedback indicating whether or not it serves these purposes.

The model is fully explained on pages 1 to 13. After its initial use for defining terms, it becomes the basis for collection of subjective and

objective data related to aptitudes, creative thinking and expression, and personality as these characteristics are expressed while the student is engaged in a particular area of human endeavor such as academic, visual and performing arts, psychomotor or psychosocial activities.

Beginning on page 26, the model is applied to the identification of children who may be gifted, talented or potentially gifted in one specific segment of the K-12 academic curriculum, physical science. Mechanical ability is considered a subset of physical science at the elementary level which is often neglected. The effects of a textbook approach to the physical sciences as compared to a "hands on" approach have been clearly demonstrated. Teachers know that there are countless ways in which girls as well as boys can creatively apply their understanding of the physical world and develop products which can be assessed in terms of their uniqueness and originality. The opportunity for programming for underachievers or potentially gifted has significant implications; our future scientists, architects and engineers may show interest at a very early age and demonstrate potential, but basic skills in math and language arts must be acquired as well as certain personal characteristics. Hopefully, an analysis of this application of the model will help planners develop rating scales useful for the identification of talented, gifted and potentially gifted students in each of the academic areas, the visual and performing arts, and psychomotor and psychosocial areas.

The rating scales presented in this publication are intended to help adults, especially teachers, collect subjective data by systematically observing selected behaviors. The limitations of rating scales in general are discussed on page 38 and it should be understood that the validity of those presented here has not yet been established. Despite their limitations, teachers and other adults who have an opportunity to observe students over a period of time may find these rating scales a valuable supplement to the use of standard tests.

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## AN IDENTIFICATION MODEL

A comprehensive model has been developed to help design, implement, and evaluate instruments and processes used to identify children and youth who are talented, gifted, or potentially gifted in an area of human endeavor. Basically, the model acts as an organizer for thinking about what it means to be talented or gifted or potentially gifted.

It has several strengths. First of all, its three components are significant to performance in any area of human endeavor. That is, the model can be applied equally well to academic areas, the visual/performing arts, vocational, psychomotor and psychosocial activities. Secondly, each component is normally distributed among the population and is developmental in nature. Therefore, each is significantly affected by instruction and guidance in the school. The model can also be used to analyze the contents of existing checklists, rating scales and tests prior to selection, or it can be used as a basis for development of these instruments at the local level. A particularly useful application is toward the development of consistent and operational definitions of the terms gifted, talented, and potentially gifted.

Characteristics of giftedness fall into three major clusters. These are represented by the three overlapping circles as shown in Figure 1 below:

Circle A: Cognitive and Psychomotor Capacities for Acquiring Fundamental Skills and Knowledge
Circle B: Creative Problem-Finding/Solving Skills
Circle C: Personal Characteristics

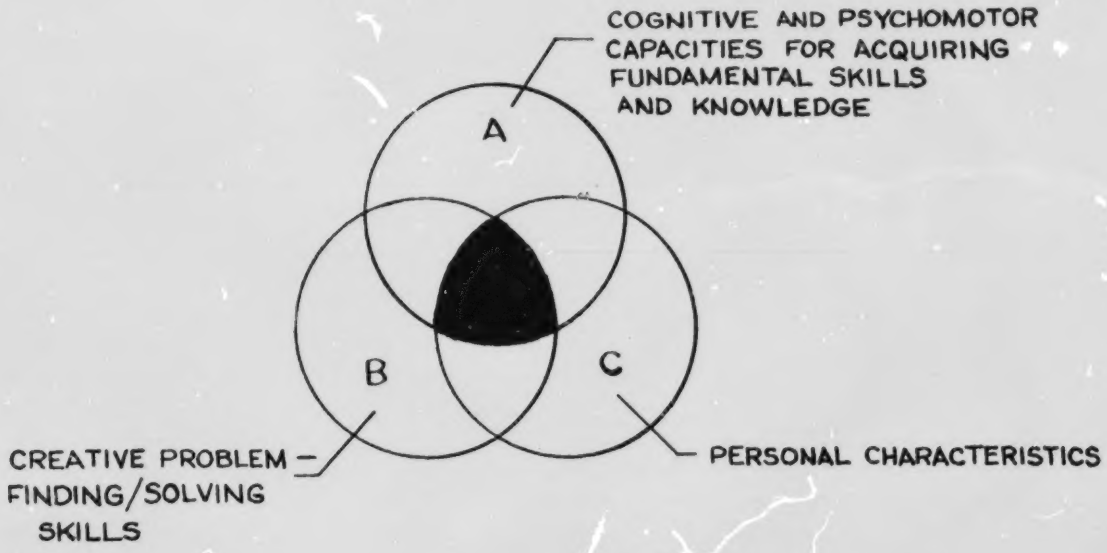


FIGURE I

Circle A represents aptitudes, the basic capacity to acquire the skills and knowledge associated with success in a particular endeavor. In other words, the outstanding performer in music has exceptional auditory capabilities for recognizing and reproducing pitch, intensity, timbre, and rhythm. A gifted student in the psychomotor area has exceptional coordination, agility, balance, strength, and physical endurance. The student with above average IQ has the intellectual capability for high achievement in math, science, or other academic areas. He/she is able to acquire and understand significantly more knowledge and higher level concepts, retain information longer and recall it more readily than the majority of his or her peers.

Circle B concerns the creative application of the ability to find and solve problems. Problem solving itself is considered basic to the education of all students and is taught systematically in math, science, and social studies classes. It is the creative application of these skills, particularly the problem finding skills that serves to differentiate gifted children and youth from all others. In other words, creativity is the significant factor in identification of truly gifted children and youth in science or math, music or dance, in high jumping or gymnastics. They are the ones who produce new ways to do things, different forms, unique ideas, unusual products.

Circle C provides for selected personal characteristics. These are the psycho-social forces that enable students to "become all they are capable of being." They include motivation, commitment, energy, acceptance of responsibility, ability to plan and organize self-control and discipline, and self-confidence.

An overlapping circle arrangement of the three primary components is used to show interrelationships of the three major clusters of characteristics, aptitudes, creativity, and personal characteristics. It is their interrelationships that define the terms "gifted" and "talented" as shown in Figure II.

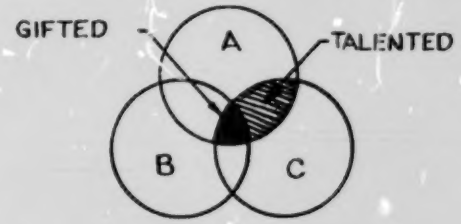


FIGURE II

Gifted students are those who are consistently able to apply their highly developed skills and knowledge as well as their personal characteristics, to creative problem-finding/solving in a particular area of human endeavor such as academics, the visual/performing arts or psychomotor activities. The accomplishments of the gifted are possible because they have exceptional aptitude for achievement in one or more areas of human endeavor and are able to develop them fully because of personal characteristics. They

also apply themselves to the development and completion of their creative ideas. They may be referred to as "outstanding," "exceptional," or "very creative" students, because of the quality and consistency of their performances and products.

In the *academic areas*, their general intellectual aptitude (Circle A), as measured by an individual test is one or more standard deviations above the mean. This capability is reflected in high achievement. Gifted students absorb ideas and information easily and reproduce it quickly, particularly in verbal form. Their ability to identify and solve problems creatively (Circle B) may be measured by creativity tests. In the classroom, the ability may be indicated by the development of unusual or unique ideas and products through projects in science, math, or other academic areas. The presence of the personal characteristics which make up Circle C is obvious through observation of the student's interest, commitment, motivation, and self confidence in his or her accomplishments in both reproducing and producing ideas, products, and processes.

In the *visual/performing arts*, the areas of dance, music, art, and drama, must be considered separately. For instance, in the assessment of capabilities related to music (Circle A), auditory sensitivity, musical sensitivity, and certain psychomotor skills must be considered, while for drama, stage movement, vocal quality and mimesis are considered essential. The products of creative problem-finding/solving in music might include new compositions while in drama, the product could be a new, perceptive interpretation of a character. Exceptional achievement or performance obviously requires great motivation, commitment, and energy, as well as self-discipline, self-confidence, and the ability to plan and manage one's resources.

In the *psychomotor area*, gifted students are exceptionally skilled performers. In addition, they are able to express their creativity through movement activities. Again, the personal characteristics have a significant role.

Talented students are those who consistently demonstrate high performance with fundamental skills and knowledge as well as personal characteristics. Teachers usually enjoy these stusdnets. They like school, are very cooperative, practice their lessons and do their assignments. They can assimilate and reproduce complex ideas and concepts, but they do not create their own. In other words, they are primarily consumers and transmitters of knowledge. The accomplishments of talented children are possible because they are able to apply their personal characteristics to the development of aptitudes.

The *academically* talented are often referred to as "bright," "very capable," "excellent students," or "high achievers" and score at or above the 90th percentile on achievement tests in a particular area. They may or may not score exceptionally high on intelligence measures.

Students talented in *visual and performing arts* perform very capably, entertaining and significantly affecting audiences. However, the creative spirit is lacking in process, performance, and/or product. They do not produce new, different, or unusal ideas, products or interpretations in the visual/performing arts.

In the *psychomotor* area, students excel at team and individual sports and activities. They practice diligently, respond well to directions, and perform enthusiastically and well. Again, they do not design new and different routines, forms, or ideas and express them through movement.

The intersections which define the potentially gifted student are shown in Figure III below:

- the intersection of Circles A and C but not B
- the intersection of Circles A and B but not C
- the intersection of Circles B and C but not A

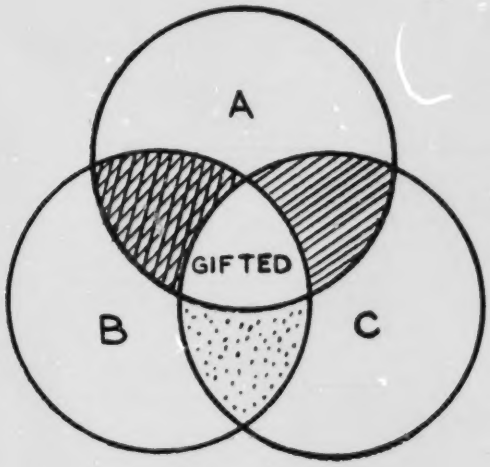


FIGURE III

It should be noted immediately that the intersection of Circle A and C has already been defined as "talented." However, they must be considered potentially gifted until they clearly demonstrate a complete lack of creativity since the possibility exists that the creative aspect may be developed. The fact that it is not a part of the student's current performance could be due simply to lack of opportunity and guidance.

Students who show potential for functioning at high levels of performance in Circle A (Fundamental Skills and Knowledge) and Circle B (Creative Problem Finding/Solving Skills) but express personal growth characteristics in the school setting in negative ways, have potential which lies in the development of psychosocial factors. The school setting, including teachers' attitudes, values, and instructional methodologies must be carefully examined and perhaps modified if this type of potentially gifted student is to be identified and programmed.

Students who function at high levels in Circles B and C but seem to be unable to capitalize on their innate capacities for development of the fundamental skills (Circle A) represent a third kind of potential. Remedial programs can provide the necessary skill development when personal characteristics are present.

## CIRCLE A: FUNDAMENTAL SKILLS AND KNOWLEDGE

### ACADEMIC

Knowledge and Comprehension
- amount
- conceptual level

Memory
- amount
- retention
- recall

Communication Skills
- listening/speaking
- reading/writing

*MATHS*

*LANGUAGE ARTS*

*SOCIAL STUDIES*

*FOREIGN LANGUAGES*

*SCIENCES*

*PHYSICAL SCIENCE/MECHANICAL*

Psychomotor
- eye-hand coordination
- spatial visualization
- finger dexterity
- balance
- control
- coordination
- visual perception, discrimination, and memory
- visual imagery

### ATHLETICS

Knowledge and Comprehension
- amount
- conceptual level

Memory
- amount
- retention
- recall

Communication Skills
- listening/speaking
- reading/writing

Psychomotor
- balance
- control
- strength
- endurance
- agility
- speed
- coordination
- flexibility
- timing

*TEAM SPORTS*

*INDIVIDUAL SPORTS*

*GAMES AND ACTIVITIES*

*GYMNASTICS*

*TRACK AND FIELD*

## VISUAL AND PERFORMING ARTS

Knowledge and Comprehension
- amount
- conceptual level

Memory
- amount
- retention
- recall

Communication Skills
- listening/speaking
- reading/writing

### *DANCE*

Psychomotor
- balance
- control
- strength
- endurance
- agility
- speed
- coordination
- flexibility
- timing

Auditory Sensitivity
- pitch
- intensity
- duration
- timbre
- rhythm

### *MUSIC*

Auditory Sensitivity
- pitch
- intensity
- duration
- timbre
- rhythm

Musical Sensitivity
- absolute pitch
- relative pitch
- tonal memory
- rhythm
- melodic reproduction
- harmonic sense

Psychomotor
- coordination
- timing
- agility
- endurance

### *ART*

Psychomotor
- visual perception
- visual memory
- visual imagery
- spatial awareness
- visual motor integration

### *DRAMA*

Stage Movement
- authority
- control

Vocal Quality
- projection
- modulation

Mimesis

## CIRCLE B: CREATIVE PROBLEM FINDING/SOLVING SKILLS

Circle B of the model represents the creative application of the skills and capacities required to identify and solve problems. The basic skills of problem finding/solving include the cognitive skills of application of knowledge and comprehension as well as the skills of analysis, synthesis, and evaluation. Values and attitudes are an inherent part of the process of applying the skills. The problem finding/solving process itself is considered an integral part of the basic educational program for all students. It is the creative application of these skills that serves to differentiate the gifted students from the talented in the disciplines of mathematics, science, social studies, or language arts as well as in art, music, drama, dance, psychomotor, mechanical, or leadership activities.

The problem-finding/solving steps are:

*Problem finding skills*

1. recognizing that a problem exists
2. gathering information
   (a) identify the elements of the problem
   (b) identify areas where additional information is needed
3. analyzing the data
   (a) organize relevant data
   (b) formulate alternatives (hypotheses)
4. defining or redefining the problem
   (a) select criteria for objectives
   (b) select criteria for strategies (valuing)

*Problem solving skills*

5. hypothesizing
   (a) generate alternatives
   (b) check each alternative for its practicality, acceptability, potential effectiveness in resolving problems
   (c) eleminate courses of action least likely to work effectively
6. selecting the best tentative course(s) of action
7. implementing the course(s) of action

Problem-finding skills are quite different from problem-solving skills, and they are equally important. Problem finding includes the ability to uncover a network of facts which may define a need or goal which was not recognized initially, while problem solving is a response to a defined need. Both aspects must be applied creatively to whatever area of giftedness is under consideration. As an example, two individuals can have the same degree of highly developed technical or fundamental skill in painting a landscape. The one who also has highly developed and creative problem-finding/solving skills will approach the task differently and will explore the many possibilities, challenge conventional techniques and content, and go beyond the beaten track in some way. The result will be a unique product which

depends partly on application of technical skills and partly on the creative use of problem-finding/solving skills. The uniqueness of the product takes on meaning in direct proportion to the extent that it resolves a problem, introduces a new problem, or transcends an earlier ambiguity or traditional belief. Thus, the gifted individual uses the same technical skills, but applies them differently and achieves different results. This difference has an intellectually creative quality and the resulting product in music or mathematics, art or language arts, is qualitatively different. Looking at creativity as the process leading to unique productions provides a useful common ground for identifying the processes and behavorial characteristics necessary to produce unique solutions.

In an ideal world, the creative individual would have a characteristic that could be easily identified. In fact, much of the research dealing with the creative individual has focused on discovering just such a characteristic. The research, however, has been singularly unsuccessful. Many characteristics have been identified that seem to go along with creativity, and that seem to be necessary for creativity, such as innovative uses for objects, unusual designs or unique responses. These characteristics by themselves, however, have proven insufficient and unreliable as the key to creativity. Apparently, it is the result of several different processes and factors, no single one of which is a sufficient predictor of creativity. Therefore, an identification program will have to deal with several interrelated creativity factors which may be observed as student behaviors.

Obviously, there is not a one-to-one correspondence between the problem-finding/solving steps and student behaviors. Items which have been developed for the rating scales are based primarily on evidence of student behaviors such as "asks many questions" rather than general characteristics such as "shows curiosity." This is an attempt to help observers note specific student behaviors and also to avoid negative interpretations based on the observers' values. Creativity is often in the eye of the beholder and the energetic and curious student may be seen as "hyper" and "nosy," the imaginative one as a "lazy dreamer," the challenging or skeptical person as an "argumentative trouble maker." The one who takes the initiative for leadership may be considered "bossy" and the one with self-confidence as "egotistical." Because these value interpretations do get in the way of accurate identification of gifted students as defined by the model, the Creative Problem-Finding/Solving Skills Rating Scale should be used by several different observers.

The following is intended to suggest possible relationships between the creative application of the problem-finding/solving skills and observable student behaviors.

| Generalized Characteristics | Observable Student Behaviors |
|---|---|
| *STEP ONE: Recognizing that a problem exists* | |
| The student: | |
| is curious, perceptive, sensitive, intuitive, skeptical; | |
| has the capacity for being puzzled; | |
| has to "find out;" | |

wants to understand the world — to know what makes things "tick;"
is very aware of peoples' thoughts and feelings . . . . . asks many questions and more complex ones than agemates;
identifies several aspects of a problem area;
asks about gaps or missing links, flows and deficiencies;
takes a broad look at problems, issues, and situations . . . . . questions common, ordinary events and ideas that most take for granted

*STEP TWO: Gathering information*

The student:
is open, receptive to new ideas, new people, and tasks;
has acquired knowledge and concepts considered basic to his or her field of giftedness;
knows and can apply the fundamental cognitive skills needed to gain new knowledge and understanding;
knows, understands, and is able to use the written or visual symbols to gain information basic to the field;
able to defer judgment . . . . . is "into everything," has unusual sources of information, does not summarily reject findings, ideas, behaviors on the basis of their source;
seeks information from a great variety of sources;
accepts conflicting data;
can apply previous learnings to new situations;
can translate to oral language data acquired from observation

*STEP THREE: Analyzing the data*

The student:
is logical in thought;
is organized mentally;
can classify;
can distinguish between cause and effect relationships, facts and hypotheses, the relevant and irrelevant differences and similarities;

can apply sequencing skills;
is able to think convergently . . . expresses ideas voluminously through use of symbols appropriate to the field;
identifies quickly similarities and differences and paradoxes;
describes a sequence of events or ideas;
has rapid insights into cause/effect relationships;
points out relationships between conceptual areas not usually related;
establishes a network of related facts and concepts;
likes to organize and bring structure to things, people, and situations;
explains underlying principles easily;
able to reach accepted and generally approved answers

*STEP FOUR: Defining or redefining the problem*

The student:
is able to relate information to moral, ethical, and aesthetic values of self and others;
can deal with ambiguities;
can think divergently;
enjoys the process of searching for "important" or "highly significant" issues or problems that are not run-of-the-mill;
is interested in moral and humane issues such as religion, politics, and environment, war, care for the elderly, what is "fair" and "just" treatment;
likes to try new things, is a risk taker;
is idealistic (or naive);
enjoys complexities;
is able to synthesize . . . . . assesses the problem in terms of values;
relates information and events to value positions;
defines or redefines the problem in terms of an expressed value position;
seems to say, "Why not try for the longshot?;"
"digs into" things;
analyzes a multiple choice question and shows how more than one choice could be correct given certain situations

*STEP FIVE: Hypothesizing*

| The student: | |
|---|---|
| is able to generate ideas and is inventive, original, fluent, flexible; is able to elaborate; likes to fantasize and use imagination . . . . . | arranges and recombines data to create new structures for looking at the problem; can think of new ways to use old or standard ideas and things; can think of novel, unique, or unusual possibilities; can think of many possibilities; can think of different kinds of possibilities, manipulates, adapts and modifies ideas; can embellish the possibilities |

*STEP SIX: Selecting course(s) of action*

| The student: | |
|---|---|
| is able to predict; is able to select and apply technical evaluation criteria, and valuing processes. . . . . | makes predictions; sets achievable long- and short-range goals and objectives; supports ideas and opinions with evidence |

*STEP SEVEN: Implementation*

| The student: | |
|---|---|
| develops a product, process, or performance which is judged as superior in quality and unusual. . | seems to have no fear of failure but uses trial and error constructively; is resourceful; wants to carry through and finish a project; is task-oriented; plans and organizes carefully; takes the initiative; is a "doer," finishes projects |

## CIRCLE C: PERSONAL CHARACTERISTICS

The third component of the model, Circle C, represents personal skills and capacities. Characteristics in this category do not by themselves serve to identify a gifted/talented person. In fact, overreliance on this component may have been responsible for many of the inaccurate identifications made in the past.

The following chart lists personal characteristics which relate to both Circle A and Circle B of the model, and student behaviors which help identify the characteristics.

| Characteristics | Behavior |
|---|---|
| 1. MOTIVATION | Is enthusiastic; shows sustained interest; carries school involvement to independent after-school activities and projects |
| | Has a great desire to make a contribution to the world |
| | Has tremendous and consistent desire to excel |
| | Becomes absorbed and deeply involved in activities |
| | Does not let temporary defeats slow efforts; keeps trying even when facing great odds |
| 2. COMMITMENT OF RESOURCES (time, energy, materials, facilities, money, etc.) | Uses most of his or her resources after school for activities and items related to field of interest |
| 3. ENERGY (amount, duration, direction, and intensity) | Has very high energy level; can keep going long after others stop for food or rest; is "recharged" quicker than most students; may be seen as "hyper;" works faster and does more than peers |
| | Has a long attention span |
| | Is very task-oriented |
| | Consistently takes the initiative |
| 4. ACCEPTS RESPONSIBILITY FOR SUCCESS AND/OR FAILURE | Consistently explains success and/or defeats realistically in terms of personal characteristics, capacities, and actions; takes personal responsibility in positive ways for the quality of his or her product or effort |

| | |
|---|---|
| 5. CAN PLAN, ORGANIZE, AND MANAGE RESOURCES | Has a specific objective clearly in mind;<br><br>Plans, organizes, and manages school and personal resources (time, space, materials, personal strengths and abilities, energy) in ways that contribute highly to accomplishment of objectives<br><br>Questions the structure of learning (Why do I have to do this?) and sequence of events (Why should I do this now?) |
| 6. EXERCISES SELF-CONTROL AND DISCIPLINE | Able to consistently focus resources on tasks;<br><br>Perseveres;<br><br>Resists temptations and distractions;<br><br>Completes many projects of high quality;<br><br>Will not give up |
| 7. SELF-CONFIDENCE | Knows and accepts personal strengths, weaknesses, and limitations;<br><br>Believes in own abilities;<br><br>Not afraid to ask for help;<br><br>Relies and builds on personal beliefs, knowledge, and experience;<br><br>Demonstrates or explains her or his work to others;<br><br>Not afraid to be the first to engage in an activity;<br><br>Talks comfortably with teachers and other adults as well as peers;<br><br>Is confident without being egotistical or arrogant |

## DESIGNING AN IDENTIFICATION PROGRAM

Effective identification programs take time, organized effort on the part of many people in the school and community, and money. Objectives are achieved most effectively when the following characteristics exist:

- There is a written plan, outlining the tasks, activities, personnel, products, and time lines.
- Multiple sources of information are used.
- Educators, students, parents and, where feasible, members of the community are involved.
- The process is continuous.
- Specialized efforts are made to identify the potentially gifted.
- Subjective and objective data gathering instruments for fundamental and problem-finding/solving skills, and personal characteristics, are applied specifically to student behaviors demonstrated while the students are engaged in an activity which interests them and at which they excel.
- Decisions about who is or is not to be in a program are made by a committee, not a test score.

The planning model which follows is intended as a general guide for implementing an identification program. The steps are not discrete and probably cannot be accomplished sequentially, since most districts are at different stages of readiness and development and the close interrelationships of the activities lead to the accomplishment of several tasks at a time. Suggested steps include the following:

PHASE ONE: Planning

1. Identify leadership
2. Conduct a needs assessment

PHASE TWO: Organizing

3. Develop a statement of philosophy
4. Provide awareness among faculty
5. Develop a written plan

PHASE THREE: Setting Priorities

6. Identify one or more specific fields for K-12 programing
7. Inform teachers and parents
8. Allocate or reallocate resources

PHASE FOUR: Nomination and Identification

9. Determine program goals, objectives, and evaluation plan
10. Set program parameters
11. Set criteria for selection of students
12. Develop process and instruments for nomination of students
13. Obtain a pool of students

14. Select instruments for collection of objective data
15. Develop/select subjective data-gathering instruments
16. Design a format for data analysis
17. Provide inservice training for use of data collection instruments
18. Identify students
19. Evaluate the identification processes and (revised) instrumentation

The initial step of PHASE ONE: Planning begins with assignment of the leadership role. Someone has to be "in charge." A person who has been specifically designated to spend time and effort is more likely to provide the kind of leadership that will make a significant difference for students. In addition, others from the school and community are needed to serve as members of a task group.

The identification process must begin with an assessment of students' needs, interests, and characteristics; the existing curriculum and instructional program; and strengths and interests of teachers and the community. Members of the task group with responsibility for conducting a needs assessment must educate themselves about the needs and characteristics of gifted and talented students and learn about special programs designed to meet their needs. The basic issues which underlie the selection of students and development of programs must be analyzed. The recommendations made by the task group will create the climate and direction of future efforts. Therefore, members should represent the diversity of needs, interests, and characteristics of the community.

Should the recommendation be in favor of organizing for further efforts to identify and program gifted and talented students, the school district would begin PHASE TWO: Organizing. There will be initial need for a statement of philosophy which provides the framework for identification, programing, and evaluation. Since both identification and programing rely heavily on the interest, commitment and skills of teachers, the faculty should be involved in a variety of ways and at the earliest possible point. Involvement of parents and members of the community as well as educators serves as a form of inservice and also as a means of building commitment.

When the task group has reached a consensus that gifted and talented students should be identified and programs developed, it is strongly urged that a master plan be developed. This activity concludes PHASE TWO: Organizing.

PHASE THREE: Setting Priorities is a complex process which involves aspects of programming as well as funding. Priorities for the gifted and talented must be considered within the context of the total school instructional program as well as within the context of a specific instructional area.

Establishing priorities for programs for the talented and/or gifted may be difficult in a time of fiscal constraint. Many factors militate against identifying and providing programs. The notion of special treatment for gifted students is still controversial. The myths persist that "cream will rise to the top" and even some educators believe that the gifted already have a "headstart" and therefore don't need special programing. Researchers in the field generally agree, however, that bright minds and giftedness cannot survive educational neglect and apathy.

Priorities must be established secondly within the context of a specific instructional area. It would be inappropriate, for example, to design a program in science at the high school level, select a teacher whose programing interests and competencies are in chemistry, accept students who demonstrate interest and commitment to geology, and design a program around the availability of a local planetarium. There is no argument that the life, earth, and physical sciences are interrelated. A major concern is that gifted and talented students have the time to explore topics in depth with appropriate resources and the guidance and knowledge of an inspired teacher.

Assuming that the conclusion of PHASE THREE: Setting Priorities results in a decision to identify and program students, school district personnel would begin PHASE FOUR: Nomination and Identification. This phase is more fully described in the sample application of the model. The ACTIVITIES FOR IDENTIFICATION PROGRAM TASKS which follows suggests more specific activities, products, and resources for implementation of the four phases of the planning model.

## IMPLEMENTING AN IDENTIFICATION PROGRAM

PHASE ONE: PLANNING

| Task | Activity | Product | Resource |
|---|---|---|---|
| 1. Identify leadership | as determined by local district | one assigned person who has support of the superintendent and board of education, and others from the school and community to serve as a task group | |
| | develop an understanding of gifted/talented students and programs in general | | |
| 2. Conduct a needs assessment | survey student characteristics | assessment of local test scores and profiles of students' capabilities and achievements as indicated by intelligence and achievement test scores | subjective and objective information from teachers, counselors, psychologists, and administrators |
| | survey student interests | results of an interest survey | STUDENT INTEREST SURVEY (page 24) |
| | survey curricular and extracurricular provisions/programs currently availalbe within the school | assessment of local district provisions/programs for gifted/talented and degree of teacher interest and commitment | teachers and administrators |
| | survey community interests and provisions for programs | assessment of community interest and possibilities for support of specific programs | parents, members of the community and civic organizations and clubs |
| | | recommendation to maintain current provisions/programs, strengthen existing ones, or develop new options | New York State Education Department publication *A Survey of Education for the Gifted and Talented in New York State in 1974-75* |
| PHASE TWO: ORGANIZING | | | |
| 3. Develop statement of philosophy for meeting the needs and interests of the gifted and talented | involve parents, educators, and members of the community | statement of philosophy accepted by local board of education | New York State Education Department Position Paper No. 23, *Educating the Gifted and Talented in New York State* |
| | relate local district philosophy to the special needs of the gifted in a written document to be approved by the board of education | | |

| Task | Activity | Product | Resource |
|---|---|---|---|
| 4. Provide awareness among faculty | present awareness work shop(s) which bring teachers up to date on data from needs assessment activities and findings | faculty motivated to go into PHASE THREE | Board of Cooperative Educational Services, Local and State Education Department personnel |
| 5. Develop a written plan for activities in PHASES THREE and FOUR | analyze this model and adapt it to local needs; include personnel designations, time lines, and objectives | written plan, approved by administration | teachers, administrators, parents, and members of the community |
| PHASE THREE: SET PRIORITIES | | | |
| 6. Identify one or more *specific* fields for K-12 programming; i.e., biological sciences rather than "science," gymnastics rather than "movement" | identify societal and community concerns and resources | list of human and technical resources categorized by area (music, art, science, et al) | |
| | analyze results of student interest survey | summary of students' specific interests (types, locations, age levels, continuity) | results of previously administered STUDENT INTEREST SURVEY |
| Identify a target group (gifted, talented, potentially gifted) for identification and programing | match student needs, characteristics, and interests with current district and community opportunities | | teachers, administrators, parents, members of community, and yellow pages of telephone books |
| | identify gaps where interested students have no opportunities | | |
| | identify teacher strengths | | |
| | identify program strengths | | |
| | list programs, facilities, events, and people in the community who do or could provide systematic instructional opportunities for gifted/talented students | recommendations for program priorities | suggested criteria:<br>• high student interest<br>• competent instruction available<br>• materials and facilities available |
| 7. Inform teachers and parents; gain their interest, support, and commitment | use faculty meetings, conference days, newsletters, et al, for in-service and communication | increased cooperation | |

| Task | Activity | Product | Resource |
|---|---|---|---|
| 8. Allocate resources | persuade the Board of Education to allocate or reallocate resources to meet the needs of talented and gifted students | a budget | administrators, parents, members of the community, and advocacy groups |
| PHASE FOUR: NOMINATION AND IDENTIFICATION | | | |
| 9. Determine broad program goals, objectives, and evaluation plan | study the literature; analyze existing programs in other school districts | written program goals, objectives, and general evaluation plan for students who are functionally or potentially talented and/or gifted in fundamental skills, creative problem-finding/ solving skills, and personal characteristics | the model proposed in this publication; Title IV-C projects in New York State |
| | provide for the collection of data:<br>rating scales<br>time needed for administration;<br>inservice;<br>evaluation;<br>cost for revisions;<br>objective instruments<br>cost;<br>availability;<br>effectiveness;<br>provide for inservice<br>content;<br>amount;<br>quality;<br>effectiveness;<br>costs | | |
| 10. Set program parameters | define "gifted" for local district planning purposes<br><br>define "talented" and "potentially gifted" for local district planning purposes<br><br>accept, adapt, or reject the model provided in this publication<br><br>determine: maximum/ minimum number of students to be programed, nature of program (for talented and/or gifted); location, amount of time, resource teachers, grade levels, role of the school, role of the community | a model for identification and programing<br><br>a broad description of the program, including definitions of students involved<br><br>(specific objectives for curriculum and instruction will need to be written in terms of the needs and characteristics of identified students) | this publication, professional journals, and consultants |

| | Task | Activity | Product | Resource |
|---|---|---|---|---|
| 11. | Set criteria for selection of students | study the literature;<br><br>analyze this publication | criteria for final selection (number, age levels, et al) | |
| 12. | Develop nomination instruments | as an inservice activity involve teachers in the process of adapting the nomination forms provided in this guide<br><br>identify a task group to manage nomination process | locally designed nomination forms | suggested criteria: information requested should (1) be program specific; (2) provide for a broad sweep of possible talented and/or gifted students; (3) be general and related primarily to performance or potential performance in activities requiring use of the fundamental and creative problem-finding/solving skills, rather than personal characteristics; (4) be independent of reading and writing |
| | | select individuals and student groups who will be asked to make nominations | | suggestions for use of nomination forms:<br><br>the STUDENT SELF-ASSESSMENT FORM should be filled out by every student who indicated high interest in the priority area and spends a great amount of time at the activity;<br><br>the ADULT NOMINATION FORM is intended for appropriate members of the community, educators, and parents;<br><br>the PEER NOMINATION FORM is for all students at the grade level(s) selected for programing |
| 13. | Obtain a pool of students | make a master list of all nominated students; assign a number to each one; analyze information from SELF-ASSESSMENT FORMS | pool of students for Step 14 | criteria for inclusion in pool:<br><br>nomination from two sources;<br><br>student indicates extensive interest and capability |
| 14. | Select instruments for collection of objective data concerning nominated students | analyze locally available objective data-gathering instruments such as group intelligence tests, individual intelligence tests, appropriate sections of achievement tests, and standardized aptitude, personality, or creativity tests | selected instruments | criteria for selection includes:<br><br>applicability to the identification model;<br><br>relevance and usefulness of group IQ scores to the priority field |

| Task | Activity | Product | Resource |
|---|---|---|---|
| | consult the literature for descriptions of additional tests | | availability of individual IQ test scores;<br><br>availability of special aptitude or skill tests;<br><br>availability and usefulness of achievement test scores;<br><br>availability of item analysis of items of test sections related to the priority field |
| 15. Develop/select subjective data-gathering instruments | collect rating scales from varied sources<br><br>adapt rating scales to the priority area<br><br>select additional subjective materials for inclusion in the selection process, such as autobiographies, cumulative records, records of counselors, and parental interviews and questionnaires | rating scales for local district priority area(s)<br><br>additional subjective materials | criteria includes:<br><br>applicability to the identification model;<br><br>appropriateness of rating scale items for fundamental skills to the priority field;<br><br>appropriateness of rating scale items for creative problem-finding/solving steps and student characteristics;<br><br>availability of opportunities to rate the problem-finding/solving skills;<br><br>availability of student products;<br><br>availability of adults to use scales and rate student products, processes and/or performances<br><br>RATING SCALE: Fundamental Skills and Abilities, page 40<br><br>RATING SCALE: Creative Problem-Finding/Solving Skills, page 48<br><br>RATING SCALE: Personal Characteristics, page 54 |
| 16. Design a format for data analysis | analyze characteristics of data-gathering instruments<br><br>develop summary matrices for objective and subjective data or adapt SAMPLE MATRICES included in this publication | Matrix for subjective data<br><br>Matrix for objective data | criteria for summary matrices:<br><br>1) manageable format<br>2) easily analyzed<br>3) ratings must be transformed to numbers |

| | | | | |
|---|---|---|---|---|
| | | | | see sample summary matrices for objective and subjective data |
| 17. | Provide inservice training for use of data-collection instruments | involve teachers in the adaptation of instruments<br><br>use faculty meetings to bring all faculty up to date on the processes | | |
| 18. | Identify students | administer subjective and objective data gathering instruments; | | each rating scale should be used by a minimum of two adults |
| | | identify members of a Selection Committee | Selection Committee including an administrator, a teacher, a special teacher, a guidance counselor or psychologist, a parent, and appropriate others to examine the data collected for the students | |
| | | develop criteria and cutoff points; rank students; use a cutoff figure of twice the number of students to be accommodated by the program | group of students who meet specific selection criteria | use products developed in Step 11 |
| | | select decision-making committee | final selection of students for programing | |
| 19. | Evaluate identification processes and (revised) instruments | evaluate information collected | recommendations for:<br><br>revised identification program;<br><br>revised curriculum and instruction to facilitate identification;<br><br>initiation of "threshold" programs specially designed to encourage development of talents and gifted among minorities and women | criteria may include:<br><br>number of females identified compared with percentage to be expected<br><br>number of functionally talented and/or gifted identified<br><br>number of potentially talented and/or gifted identified<br><br>number of minority students compared with expectations<br><br>criteria used in Steps 14 and 15 should also be applied |

## IDENTIFYING STUDENT INTERESTS

The STUDENT INTEREST SURVEY on the following page, is suggested as a means of gathering information for a needs assessment during Phase One: Planning. The results are used again during Phase Three: Setting Priorities, and as part of the nomination process during Phase Four: Identification. Therefore, individual student surveys should be kept and made available at different points in time.

The STUDENT INTEREST SURVEY is designed as a classroom activity to simply find out what students do in their free time at school, home, and community, when they make the choices, and the degree of commitment and motivation. Students' interests are of great importance and an indication of high interest would be a significant determiner in the decision to make Physical Science/Mechanical Abilities a program priority. The survey may also indicate whether or not opportunities exist for involvement in such activities during school. It will need to be adapted to meet the needs of various age levels.

Before students complete the survey, teachers should briefly point out the purpose of the survey and indicate the kind of responses desired. Discussion should concern the great variety of activities generally included in the areas of math, science, language arts, social studies, music, art, physical movement, and mechanical activities, socializing and leadership. While some students may indicate a preference for eating, watching TV and sleeping and have engaged in these activities at every opportunity they have had since childhood, such information may not serve the purposes of the survey.

Directions to the survey should be read to the students and completed immediately following the class discussion. The information might be summarized initially as a class activity. Later, it must be collated on a grade level, building, or district basis.

The Classroom Summary Worksheet is one way to organize survey results. The method used will depend in part on the number of classes involved and the extent to which teachers consider student interests an important element in planning instructional activities.

Analysis of the sample recommendations of the faculty to the Study Group for Education of the Gifted at the local level, page 25, would indicate a continuing interest in the identification of students' interests and provision of opportunities for all students to develop and expand their interests. The first recommendation, for a threshold, or project type program which can accomodate a high number of students with varying degrees of skills and abilities, demonstrates an intent to continue in that direction. The second recommendation recognizes the fact that many students may be interested in a particular area, but it is quite likely that only a few will have exceptional abilities or potential. These students will need a program which provides higher level information, opportunities to develop and apply more complex skills and situations in which innovative ideas and original creations can be designed.

Recommendations will, of course, be uniquely appropriate to the local situation.

STUDENT INTEREST SURVEY

Name _____

Date _____

DIRECTIONS TO THE STUDENT: In Column A, please list in order of preference your favorite activities — things you love to do at school, at home, or in the community. (You do not need to list three and may list more if you wish.) In Column B, circle the number that indicates the frequency of your involvement.

| A Activities | B Frequency | | | |
|---|---|---|---|---|
| | seldom | frequently | very often | every chance I have |
| 1. | (1) | (2) | (3) | (4) |
| 2. | (1) | (2) | (3) | (4) |
| 3. | (1) | (2) | (3) | (4) |

For how long have you had an interest in these activities? Please check (✓) the time for each.

1. _____ (activity)
   1 just recently _____
   2 this school year _____
   3 over the last several years _____
   4 since childhood _____

2. _____ (activity)
   1 two months _____
   2 this school year _____
   3 over the last several years _____
   4 since childhood _____

3. _____ (activity)
   1 two months _____
   2 this school year _____
   3 over the last several years _____
   4 since childhood _____

Briefly describe each activity. What are you doing? What do you hope to make, achieve, or do?

1.

2.

3.

WORKSHEET: Classroom Summary

STUDENT INTEREST SURVEY

Class _____

Number of Students _____

Date _____

DIRECTIONS: (1) Analyze the descriptions of each activity listed by students. Make a tentative determination of the instructional area related to the activities. For instance, "writing poetry" could be considered a part of creative writing while "building and operating a ham radio" could be considered part of science, etc.

(2) List the activities presented by the students and the instructional area which most nearly relates.

(3) Tally the responses under "Frequency" and "Interest."

| Instructional Area/Activity | Frequency Listed | Frequency of Involvement | | | | Continuity of Interest | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |

RECOMMENDATION: For Study Group (Gifted Education)

Grades: _____

Date: _____

FROM: _____

The results of the Survey of Student Interest have been analyzed. They correlate closely with the efforts we have been making to provide for the development of a variety of interests, for all students. An additional interest in space, rocketry, intergalactic flights, and ancient astronauts seems to have developed, perhaps as a result of Star Wars and other films as well as TV.

The faculty recommends the following:

1) development of a project-oriented threshold program which would be exploratory in nature and open to all students; activities should involve the design and construction of simple and complex mechanical structures based on information from such areas of study as astronomy, physics, and history.

2) identify students who have exceptional abilities or potential in addition to interest in this area, and design a special program for them.

## SAMPLE APPLICATION

The content of the identification model is applied here to the development of instruments and procedures for the nomination and selection of students who are gifted, talented, or have potential in the area of physical science and mechanical activities. The rating scales are intended as models for the content of parts A, B, and C of the model and have been directly related to physical science/mechanical activities through the vocabulary and concepts. In order to be applied to other academic areas or to athletics or the visual and performing arts, the basic format may be used but the language must be adapted. The following instruments and worksheets will be described:

- ADULT NOMINATION FORM
- PEER NOMINATION FORM
- STUDENT SELF-ASSESSMENT FORM
- RATING SCALE: Fundamental Skills and Abilities
- RATING SCALE: Creative Problem-Finding/Solving Skills
- RATING SCALE: Personal Characteristics
- SUMMARY MATRICES

The nomination forms and rating scales provided in this publication or those developed locally should not be used until inservice sessions have been held. Information concerning the following topics should be provided:

- the identification model
- characteristics of students who may be talented and/or gifted in physical science/mechanical activities
- the results of the STUDENT INTEREST SURVEY
- descriptions of the development and uses of the nomination forms and rating scales
- use of the worksheets and summary matrices

The overview below provides information concerning the characteristics of students who may be talented and/or gifted or potentially gifted in the area of physical science/mechanical activities.

### OVERVIEW: Physical Science and Mechanical Ability

Mechanically gifted students are those who possess a unique ability, which may be defined as unusual understanding of the interrelations of principles, structures, and objects involved in designing, assembling, repairing, building with, or constructing the machines, tools, and structures for communication, transportation, defense, and other systems in society. The emphasis is on the creative application of mechanical understandings, skills, and capacities rather than on manual dexterity. Mechanically gifted students perform consistently better both quanititatively and qualitatively at mechanically oriented tasks than do their age mates.

The process of identifying mechanically gifted students presents a challenge. Such students often go unnoticed because general intelligence tests ignore their special abilities and the classroom teacher may not be aware of the

special attributes which constitute giftedness in this particular field. Few classrooms provide experiences designed to promote and demonstrate skills beyond those presented in physical science units of electricity, motion, simple machines, etc. Often, they are presented as textbook studies rather than as experiments. Students who are interested may be discouraged by the educational priorities or processes at school, or by their parents at home. Thus, a special effort must be made to find the mechanically gifted.

Basically, they are interested in the physical world, from space rockets to clocks. They want to find out how and why things work singly and in systems, and can visualize and sketch patterns complete with details. Students to be identified are those who demonstrate capacity for development of the fundamental and creative problem-finding/solving skills, and also have certain personal characteristics. The basic fundamental skills required for high performance in this field are based on the student's exceptional capacities for the following skills and abilities:

Knowledge and comprehension
- amount
- conceptual level

Memory
- amount
- retention
- recall

Communication Skills
- listening/speaking
- reading/writing

Psychomotor
- eye-hand coordination
- spatial visualization
- finger dexterity
- balance
- control
- coordination
- visual perception, discrimination, and memory
- visual imagery

Items on the Rating Scale: Fundamental Skills relate to the development of the basic intellectual capacities as well as psychomotor skills. Descriptors are based on the quantitative and qualitative language and behavioral characteristics of students who are involved in mechanically oriented tasks. These may be observed during activities such as the following, which require use of the psychomotor skills:

- participating in classroom activities related to physical science units on force, energy, etc.
- putting puzzles together
- repairing toys, bicycles, small engines, cars
- using ordinary tools
- building models from kits
- constructing social studies projects
- playing musical instruments
- working with crafts (sculpting, carving, sewing, making pottery, weaving, making jewelry, working leather, etc.)

Items on the Rating Scale: Creative Problem-Finding/Solving Skills are based on the relationships between the problem-finding/solving steps and the enabling psycho-social characteristics such as curiosity and openness. These relationships and student behaviors which may be observed are shown below.

| PROBLEM-FINDING/ SOLVING SKILLS | | | STUDENT BEHAVIORS |
|---|---|---|---|
| STEP ONE: Recognize a problem | displays curiosity; perceptive, sensitive, aware | : | sensitive to the relationships of things to people; asks many complex questions about mechanical things; wants to take things apart to see how they do or don't work |
| STEP TWO: Gather information | is open to many sources of information; understands basic principles | : | knows and uses reference materials related to the physical sciences; is able to use tools and processes appropriately; has an unusually advanced vocabulary related to mechanical processes and things |
| STEP THREE: Analyze data | able to think logically | : | compares and contrasts mechanical devices, processes and systems; explains how and why they work; compares concepts such as power, interaction, force; generalizes to new situations in the physical sciences |
| STEP FOUR: Define or redefine the problem | is able to synthesize; imaginative; independent thinker; elaborates well; tends to be nonconformist; is able to think divergently, creatively; is persistent | : | builds and rebuilds things, and tries new combinations; designs new and different structures, systems and subsystems; works independently on projects in the physical sciences |
| STEP FIVE: Generate hypotheses | is able to think divergently, creatively; is original, fluent and flexible; is able to elaborate | : | thinks of new ways to use old or standard equipment, toys, machines; thinks up new devices or machines to do something; thinks of many different ways to make something work |
| STEP SIX: Select course(s) of action | can evaluate products and processes in the physical sciences and mechanical fields | : | gives reasons why mechanical things work or don't work; can give reasons why one is better than the other; is able to predict what will correct malfunctions |

| | | | |
|---|---|---|---|
| STEP SEVEN: Implement | takes the initiative; is a resourceful, task-oriented, organized, independent worker | : | is a "doer"; develops more products which are qualitatively better than agemates; products are aesthetically pleasing |

Creative problem-finding and solving language and behaviors may be observed while students are engaged in activities such as the following:

- demonstrating or constructing projects in physical science on electricity, motion, magnets, light, energy, gravity, friction, simple machines
- repairing bicycles, small engines, clocks, etc.
- building toys, boats, etc. with scrap materials
- constructing with tinkertoys, erector sets, etc.
- taking gadgets, machines, or appliances apart and putting them back together
- following directions for the assembly of objects
- analyzing mechanical forces and movements, explaining the processes and applying ideas to other situations
- applying technical knowledge gained by observing, listening, reading, etc.

The rating scale, Personal Characteristics, relates to the third aspect of the model. Personal characteristics of the student may be indicated by behaviors such as the following:

| | |
|---|---|
| motivation | the student consistently seeks many challenging opportunities for involvement in physical science activities beyond those typically provided by the school |
| commitment | the student gives a significant portion of his/her resources (time, energy, materials, facilities, money, etc.) to things and activities related to this field |
| energy | the student consistently spends more energy for a greater amount of time than do his agemates; is able to constructively and consistently focus energies on tasks in this field |
| accepts responsibility | takes personal responsibility for the amount and quality of actions and products; does not make excuses or blame other people or events; can realistically appraise his or her personal accountability |
| plans, organizes and manages resources | has a specific physical science objective in mind and works effectively towards its accomplishment |

| | |
|---|---|
| exercises self-control | perseveres; has determination and strength of mind; resists temptations and distractions; will not give up; completes many projects of high quality |
| self-confidence | knows and believes in his/her own abilities; relies on personal beliefs, knowledge, and experience about the physical sciences and mechanical activities |

Students who can apply the personal characteristics described above to the high level development of their fundamental capacities are talented. Students who have the additional capacity to develop creative applications of the problem-finding/solving skills may be defined as gifted. In the area of physical science/mechanical activities, the products would be unique, different, and unusual creations in the areas of machines, electricity, and physics.

Potentially gifted students may fall into three categories. One group, the educationally disadvantaged, may have the personal characteristics and creative problem-finding/solving abilities but lack the necessary background in math, science, and reading ability. Another group, the psycho/socially disadvantaged, may have the fundamental skills developed as well as exceptional abilities to apply the problem-finding/solving skills creatively, but lacks personal characteristics such as motivation, commitment, self-discipline, and self-confidence. A third group, which may have both the necessary personal characteristics and fundamental skills, has been designated "talented." Some students in this group may be potentially gifted, if they show signs of developing the necessary creative problem-finding/solving skills and abilities.

## NOMINATION FORMS

The content of the nomination forms is quite broad. Basically, they are intended to generate quick responses to general questions related to the intellectual and psychomotor capacities, skills, and abilities (Fundamental Capacities), creativity (Creative Problem-Finding/Solving), and the affective domain (Personal Characteristics).

The Adult Nomination Form should be used by several adults, including classroom teachers, special teachers, and members of the community who have had close personal contact with the student.

The Peer Nomination Form provides for nominations from the student body, at the grade levels from which students are to be selected. The Student Self-Assessment Form should be completed by those students who indicated on the Student Interest Survey that they are extremely interested in the priority area, spend a significant amount of their time participating in those activities, and have had the interest over an extended period of time.

ADULT NOMINATION FORM: Physical Sciences/Mechanical Ability

TO:

DIRECTIONS: We want to identify students who are exceptionally interested and capable in the physical sciences and mechanical activities. Who comes to mind quickly when you need someone to fix a piece of equipment that has broken down in the classroom? Who talks endlessly about projects s/he has built or is building with erector sets, kits, or from odds and ends and uses a broad vocabulary, not typical of agemates? Who is extremely interested when experiments are done in electricity light, energy, friction, or simple machines and can also do the math that's required? Who is not only tremendously interested, but also seems to have a knack for using tools and equipment and explains easily how and why they are used?

Would you make a list of students who fit this broad description? Please include students who may be failing reading or math but seem to do well in the activities which don't require these skills. Then would you review it and put an asterisk (*) by the names of those who are outstanding?

Please give your list of names to _____.

Thank you!
The Nomination Committee

The names of all students nominated may be summarized in the following manner:

WORKSHEET: Summary of Nominations From Adults Date _____

| | Students | Frequency of Nomination |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |
| 11. | | |
| 12. | | |
| 13. | | |
| 14. | | |
| 15. | | |

PEER NOMINATION FORM: Physical Sciences/Mechanical Ability

TO:

DIRECTIONS:
1. Please read the following information and questions to the students.
2. Ask them to list on a sheet of notebook paper, the names of students who come to mind as you read.
3. Collect the names and compile a list on the worksheet Physical Sciences/Mechanical Ability.
4. Return the worksheet to _____.

Thank you!
The Nomination Committee

We want to find out which students in this school are exceptionally interested and capable in the physical sciences and mechanical activities. They are good at repairing toys, bicycles, small appliances, clocks, and equipment and at building with erector sets, kits, or even odds and ends of materials. They use tools well. They love to build things and they're good at it. They're also good when it comes to doing classroom experiments with batteries, machines, magnets, and pulleys. They spend a lot of time doing these things at home, too. You may have seen some of the projects or hobbies they've been involved with at home, from rebuilding engines to designing lasers and rockets and you are impressed. Sometimes, they have accumulated many electronic gadgets and equipment and they know a lot about their use. What students come to mind? They can be from any classroom or grade. Please write their full names.

Each teacher should summarize information in some form. The following is one way:

WORKSHEET: Summary of Student Nominations

Classroom _____

Date _____

| Students | Frequency of Nomination |
|---|---|
| 1. Mary Smith | /// |
| 2. John Jones | //// |
| 3. | |

The Nomination Committee needs to compile on a master list the information from the nomination and Student Interest Survey forms. The latter instrument serves as a self-nomination form and should be carefully examined at this point. The following is a sample summarization.

SUMMARY: Students who 1) indicated high interest on Student Interest survey
2) were nominated by adults
were nominated by peers

Students Names:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.

The students on this list should be given the Student Self-Assessment provided on the following pages. Students who have trouble reading or writing should receive help while they complete the form.

STUDENT SELF-ASSESSMENT: Physical Science/ Mechanical Activities

Name _____

Date _____

You have been identified as someone who has a strong interest in activities related to the physical and mechanical sciences. In other words, you like to experiment with mechanical gadgets, motors, and machines or operate equipment. Maybe you're one who likes to fix bikes, clocks, T.V.'s or engines, or build things, using science equipment, or carpenter's or mechanic's tools. Perhaps you make drawings or models of things that you're inventing.

We'd like to find out more about your work in these activities. Would you briefly describe an out-of-school project or activity in which you were involved for a few weeks. Choose one where you produced something related to your interest in the physical and mechanical sciences. It could be something you built, repaired, designed, or assembled, either alone or with someone else. It might be a hobby or collection or a series of experiments that you're working on. It might have been done during your spare time at school, at home, or in the community on nights and weekends. Use the following space to describe the activity or project.

Project Description

Would you answer the following questions related to the project?

1. How much time did it take to complete it?

2. Are you satisfied with the way it came out? Yes _____ No _____

   • In what ways do you consider it good?

   • In what ways is it poorly done?

   • How would you rate its overall quality?
     fair good very good exceptional

   • How would you rate its inventiveness or originality?
     fair good very good exceptional

3. What would you do differently next time?

4. Who helped you the most? How did he or she help?

5. What was the greatest problem when it came to getting it finished?

6. Will you do this activity or project again? Why or why not?

7. What books, magazines, etc., do you regularly use for sources of information?

8. What math skills were required for this project?

9. What science units, projects, or courses were most helpful?

10. What would you ask for if you could have anything you needed to become more successful in projects like the one you've described here?

11. Would you list the things you can

| operate | put together | make | repair | build |
|---|---|---|---|---|

Of what clubs are you a member? _____

_____

_____

_____

What offices have you held? _____

_____

_____

_____

Have you been awarded any prizes or honors for your work? What were they?

Do you have any collections or hobbies? What are they?

_____

_____

_____

How accurately do your grades in science reflect your ability? Please circle the description which most closely fits.

| Almost Never | Not Very Often | Half of the time | Most of the time | Almost Always |
|---|---|---|---|---|

Describe any special experiences you have had because of your interest in the physical sciences and mechanical activities.

Describe any special training you've had that's related to this field.

## Concluding the Nomination Process

At this point, the Nomination Committee must carefully analyze the Student Self-Assessment Forms for clues to talent and/or giftedness. Whenever possible, students should be interviewed and their projects informally rated and discussed. Interest must be focused on the student's motivation and commitment to the field of physical science/mechanical activities as demonstrated by personal involvement in projects and activities of his or her own choosing. After thorough analysis of this information, the committee should develop a nomination list of students for whom additional data will be collected, during the selection process. The following criteria may be used in the development of a Nomination List:

1) frequent nomination by adults
2) frequent nomination by peers
3) degree of motivation and commitment as indicated on the Student Self Assessment Form
4) high rating of the product, process or performance presented via the Student Assessment Form.

## Selection Instruments and Procedures

Both subjective and objective information need to be collected in order to select students and design programs. As indicated on the SAMPLE SUMMARY MATRIX: Objective Data on page 63, there are many sources of objective data within the school and they should be used. The rating scales are offered as a basis for adaption by educators.

Raters should become thoroughly familiar with the basic identification model in order to understand its application to the area of Physical Science/ Mechanical Abilities. As indicated on the chart on page 61, the rating scale for Physical Science/Mechanical Abilities: Fundamental Characteristics has two parts. One part provides for identification of knowledge, comprehension, memory, and communication abilities considered basic to high level performance in this particular area, while the second part concerns the psychomotor skills. It should be noted that a similar scale for academic areas such as math or social studies may not require a section for the psychomotor skills.

Specific scale items related to knowledge, comprehension, memory, and communication are found with the categories of listening, speaking, reading, and writing. Obviously, the intent is to identify cognitive skills and abilities which may be exhibited verbally as well as through reading and writing, since potential talent and/or giftedness is easily obscured when primary emphasis is placed on the ability to read and write. This does not, of course, minimize the ultimate importance and essentialness of reading and writing, especially in the academic areas.

The rating scale for creative problem-finding/solving skills and abilities calls for adults to rate items specifically related to the seven steps in the model on page 7. This may be difficult, since activities which require application of knowledge to new settings, divergent thinking, synthesis and

evaluation are not a systematic part of every instructional program. Where that is the case, special activities will have to be designed specifically for observational and diagnostic purposes. A panel should rate the quality and innovativeness of student products, processes or performances, as indicated in item 8 of the creative problem-finding/solving scale.

Information derived from the rating scale and the judgment of experts should be compared with information from the STUDENT SELF-ASSESSMENT FORM, previously completed by the student as part of the nomination process. If there is a reading or writing problem, the self-assessment form should be used as the basis for discussion of the student's problem-finding/solving abilities and interests.

A careful distinction should be made between the purposes of the STUDENT SELF-ASSESSMENT FORM and the rating scale for CREATIVE PROBLEM-FINDING/SOLVING. The self-assessment form elicits information about interests and activities and there may have been an informal rating of student products. The rating of process, performance, or products which is called for on this scale, indicates talent and/or giftedness as defined by professionals in the field. Students who have the interests may or may not have talent and the reverse can also be true. The differences are highly significant to programing.

The seven characteristics rated in the Personal Characteristics Scale are those which appear to contribute highly to human achievement. They might be summed up as "positive self-concept factors." Recognition of these characteristics is only the first step. Finding ways to influence their positive growth in the context of the school is a continuing concern.

## Rating Scales: Use and Limitations

Rating Scales for fundamental skills, creative problem finding/solving and personal characteristics, based on the model, are presented on the following pages. It should be noted that the rating scales have not been field tested; a survey of the literature has indicated the usefulness of the items, however. Their major purpose is to provide adult raters with descriptions of intellectual, creative, psychomotor, and psychosocial behaviors which bring forth images of a student. The usefulness of rating scales may be limited, due to the following problems:

1. Some raters hesitate to give either extremely high or extremely low ratings.

2. Sometimes, scale items are generalized by the rater to account for overall behavior. Items are intended to be specific to the field and should be rated as they apply to that field only. That is, a student may be highly motivated, competitive, and creative when engaged in physical science activities and exhibit very different and negative behaviors during social studies or music activities. Ratings must reflect the behaviors in the physical sciences, not school in general, or another subject.

3. The rater must take care to separate behaviors which are often related instructionally such as reading and writing, or listening and speaking. Each should be rated as the separate entity that it is. It must be remembered that a student who is intelligent and/or creative may or may not always be competent at reading and writing. Thus, it is imperative that indications of exceptional listening abilities and verbal behaviors be carefully analyzed.

4. Most items are intended to describe one quality or trait. Raters may be influenced in their evaluation by the presence of negative behaviors, however, and, as a result, shift their rating downward. For instance, a student may be highly motivated and ask many complex, relevant questions during a demonstration. A teacher may see the questions as offensive rather than indicative of possible giftedness, and give a low rating for the timing rather than the quality of the questions.

5. The values of the rater enter the picture in another way. It is a human characteristic to observe and evaluate behavior on the basis of personal likes and dislikes. Thus, a rating may be favorable or unfavorable to a student on the basis of rater bias. Use of the scales by several raters diminishes this problem.

Despite the limitations, rating scales are a valuable supplement to standardized tests, for the identification of potential as well as functional talent and/or giftedness. Teachers and other adults who work with students in challenging situations, can, through observation, learn many things about students which cannot be detected in standardized tests. Observational data collected through use of rating scales may provide indications of need for further individualized evaluation.

RATING SCALE: Fundamental Skills and Abilities

ACADEMIC AREA: Physical Science/ Mechanical Abilities

Student Number_____

Date_____

RATER:

PART ONE: Psychomotor

DIRECTIONS: Please rate the student's ability by comparing his or her performance with that of agemates and circle the appropriate number based on the following scale:

| | 1 very poor | 2 fair | 3 average | 4 very good | 5 exceptionally good |
|---|---|---|---|---|---|
| 1. visual memory | 1 | 2 | 3 | 4 | 5 |
| 2. eye-hand coordination | 1 | 2 | 3 | 4 | 5 |
| 3. spatial visualization | 1 | 2 | 3 | 4 | 5 |
| 4. visual imagery | 1 | 2 | 3 | 4 | 5 |
| 5. finger dexterity | 1 | 2 | 3 | 4 | 5 |
| 6. balance | 1 | 2 | 3 | 4 | 5 |
| 7. arm-hand steadiness | 1 | 2 | 3 | 4 | 5 |
| 8. motor coordination | 1 | 2 | 3 | 4 | 5 |

SUMMARY: Part One

| | | |
|---|---|---|
| number of items scored exceptionally good | x 5 is | _____ |
| number of items scored very good | x 4 is | _____ |
| number of items scored average | x 3 is | _____ |
| number of items scored fair | x 2 is | _____ |
| number of items scored very poor | x 1 is | _____ |
| | Total Points | _____ |

Transfer the total point score to number one, Part one, of the Summary Matrix for subjective data on page 61.

PART TWO: Communication Skills

DIRECTIONS: Please read the following statements and descriptors carefully. Put a check in the parentheses below the descriptors that best describe the student while s/he is INVOLVED IN AN ACTIVITY DIRECTLY REALTED TO PHYSICAL SCIENCE/MECHANICAL ARTS. Since not all the characteristics can be observed during a single experience, many of your judgments must be cumulative. It is important to distinguish between the student's performance while engaged in activities related to this particular area and behavior exhibited during other experiences. You may choose to rate each item, or, having read and thoroughly understood the items which indicate the skill level for listening, speaking and writing respectively, you may wish to give a composite rating for each aspect. These may be summarized on the chart which concludes the rating scale.

1. Listening

a. interest

| | | | |
|---|---|---|---|
| below average | average response to listening activities; does not follow oral directions particularly well | responds well to listening activities, audio visual presentation | responds exceptionally well to listening activities, audio visual presentations and demonstrations; follows oral directions very well when constructing "hands on" projects |
| ( ) | ( ) | ( ) | ( ) |

b. preference

| | | | |
|---|---|---|---|
| below average | shows no preference for listening activities over reading activities | often prefers activities which do not require reading; uses records, tapes if the opportunity is available | consistently prefers activities which do not require reading; requests records and tapes |
| ( ) | ( ) | ( ) | ( ) |

c. rate of learning through listening

| | | | |
|---|---|---|---|
| below average | average in ability to pick up ideas and details by listening | quicker to pick up details and ideas related to the physical sciences by listening than the average student | has exceptionally quick mastery of information related to the physical sciences; information does not have to be repeated |
| ( ) | ( ) | ( ) | ( ) |

d. amount of information gained by listening

| | | | |
|---|---|---|---|
| below average | has obtained average amount of information and ideas by listening | has gained more information about the physical sciences by listening than the average student. | student has acquired through listening significant amounts of information related to physical sciences. |
| ( ) | ( ) | ( ) | ( ) |

e. vocabulary level (oral)

| | | | |
|---|---|---|---|
| below average | vocabulary related to mechanical activities is typical for age level | uses vocabulary at somewhat advanced level for age | uses advanced level vocabulary for tools, equipment, functions, forms, processes and principles |
| ( ) | ( ) | ( ) | ( ) |

f. aural comprehension

| | | | |
|---|---|---|---|
| below average | average ability to interpret and explain material, demonstrations and pictures related to mechanical activities and the physical sciences | interprets and explains quite well material related to the physical sciences and mechanical activities; is often able to express ideas and information using own words. | easily interprets and explains orally material, demonstrations, and pictures related to the physical sciences; consistently able to relate ideas and information in own words rather than merely quote others |
| ( ) | ( ) | ( ) | ( ) |
| below average | has average ability to verbally summarize | is able to summarize thoughts and ideas quite well | can quickly summarize thoughts and ideas; draws conclusions easily; has rapid insights; quickly makes valid oral generalizations about events, people and things related to this field. |
| ( ) | ( ) | ( ) | ( ) |
| below average | has average ability to follow oral directions | is above average but not exceptional | follows oral directions very quickly and easily |
| ( ) | ( ) | ( ) | ( ) |
| below average | is at grade level on classroom listening skills test | is one or two years above grade level on classroom listening skills test | is more than two years above grade level on a classroom listening skills test |
| ( ) | ( ) | ( ) | ( ) |

g. recall of information heard

| below average | has average ability to recall information she or he has heard | has ability to accurately recall above average amount of information | has exceptional ability to accurately recall extensive details, concepts, events, and ideas which he or she has heard; responds quickly |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

h. retention of information heard

| below average | has average retention ability for typical amounts of information | is good at retaining more than the average amount of information | retains significant amounts of information over an exceptionally long period of time |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

COMPOSITE RATING: LISTENING

| below average | average | above average | exceptional |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

2. Reading Skills

a. rate of learning through reading

| below average | average in ability to pick up ideas and details by reading | quick to pick up ideas related to the physical sciences and mechanical activities | exceptionally quick to pick up details and ideas related to physical sciences and mechanical activities |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

b. amount of information gained by reading

| below average | obtains average amount of information and ideas about physical sciences by reading | obtains more information from reading than the average student | is a voracious reader; uses school and community libraries; acquires significant amounts of information thru reading related to this field |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

c. vocabulary level (reading)

| | | | |
|---|---|---|---|
| below average | reading vocabulary for this field is average | reading vocabulary for this field is very high | reading vocabulary for physical sciences is at an exceptionally high level. |
| ( ) | ( ) | ( ) | ( ) |

d. comprehension (reading)

| | | | |
|---|---|---|---|
| below average | has average ability to interpret and explain material related to the physical sciences and mechanical activities | interprets and explains material and pictures quite well; is often able to relate ideas and information in own words | easily interprets and explains material and pictures related to the physical sciences; consistently able to relate ideas and information in own words rather than merely quote others |
| ( ) | ( ) | ( ) | ( ) |
| below average | has average ability | is above average but not exceptional | can quickly summarize thoughts and ideas; draws conclusions easily; has rapid insights; makes valid generalizations about events, people and things related to this field |
| ( ) | ( ) | ( ) | ( ) |
| is below average | instructional reading level is at grade level | instructional reading level is one or two years above grade level | instructional reading level is more than two years above grade level |
| ( ) | ( ) | ( ) | ( ) |

e. recall of material read

| | | | |
|---|---|---|---|
| below average | has average ability to recall information he or she has read | has very good recall of more information than the average student | has exceptional ability to recall extensive details, concepts, events, and ideas from reading related to this field; responds quickly |
| ( ) | ( ) | ( ) | ( ) |

f. retention of material read

| below average | has average retention of typical amount of information | is very good but not exceptional at retaining information | retains significant amounts of information over an unusual period of time |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

g. knowledge of visual symbols

| below average | has average knowledge of the visual symbols associated with math, the physical sciences, and mechanical activities | is above average but not exceptional | understands and uses the visual symbols associated with math, the physical sciences and mechanical activities |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

| below average | shows average preference for reading about the physical sciences and mechanical arts | amount of reading about this field is above average but not exceptional | shows a decided preference for reading materials related to this field |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

COMPOSITE RATING: READING

| below average | average | above average | exceptional |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

3. Communication Skills (verbal)

a. fluency

| below average | has average fluency | is above average but not exceptional | has a flexible and expressive manner of speaking; has clarity in development of ideas; seems to have an easy grasp of language |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

b. richness

| below average | has average richness | is above average but not exceptional | demonstrates richness of imagery and expression in informal language; uses colorful expressions |
|---|---|---|---|
| ( ) | ( ) | ( ) | ( ) |

c. preference for verbal communication

| | | | |
|---|---|---|---|
| below average | has typical amount of interest in talking about the physical sciences and mechanical activities | is above average but not exceptional; this area is not a consuming interest | talks a lot; constantly carries on conversations about mechanical activities with peers, older students, adult workers in the school (secretaries, aides, custodians, bus drivers, et al) |
| ( ) | ( ) | ( ) | ( ) |

| COMPOSITE: VERBAL COMMUNICATION | | | |
|---|---|---|---|
| Below average | average | above average | exceptional |
| ( ) | ( ) | ( ) | ( ) |

4. Communication Skills (Written)

a. Organization

| | | | |
|---|---|---|---|
| below average | has average ability to organize information and ideas in written work | is above average, but not exceptional | organizes information and ideas exceptionally well in writing |
| ( ) | ( ) | ( ) | ( ) |

b. preference

| | | | |
|---|---|---|---|
| below average | performance is typical for age level | is above average but not exceptional; sometimes writes stories, poems, etc. | prefers to use writing as a means of communication; writes creative stories, poems, plays, letters in addition to required assignments |
| ( ) | ( ) | ( ) | ( ) |

| COMPOSITE: COMMUNICATION (WRITTEN) | | | |
|---|---|---|---|
| below average | average | above average | exceptional |
| ( ) | ( ) | ( ) | ( ) |

SUMMARY: Part Two

Indicate by check (✓) on the chart below the composite student performance level for each of the four areas. The scores should be transferred to the SAMPLE SUMMARY MATRIX: Subjective Data on page 61. Significant discrepancies should be noted in the space provided under the COMMENTS. They provide valuable diagnostic information. Exceptionally well developed listening/speaking skills by themselves indicate potential talent and/or giftedness in an academic area. A student who has exceptional listening and speaking skills but is average or below in reading and writing should receive remedial help since, ultimately, success in physical science/ mechanical abilities depends on mastery of these skills.

Performance level

| | | below average | average | above average | exceptionally high |
|---|---|---|---|---|---|
| Fundamental Skills | listening | | | | |
| | reading | | | | |
| | verbal | | | | |
| | written | | | | |

COMMENTS:

RATING SCALE: Creative Problem-Finding/Solving Skills

ACADEMIC AREA: Physical Science/ Mechanical Abilities

Student Number _____

Date _____

RATER:

DIRECTIONS: Please read the following statements and descriptors carefully. Put a check in the parentheses below the descriptors that best describe the student while s/he is INVOLVED IN AN ACTIVITY DIRECTLY RELATED TO PHYSICAL SCIENCE/MECHANICAL ARTS. Since not all the characteristics can be observed during a single experience, many of your judgments will be cumulative. It is important, however, to distinguish between the student's performance while engaged in activities related to this particular area and behavior exhibited during other experiences. Each item should be rated because the creative problem-finding/solving process is as significant as the end result, which is a product of some kind.

1. Recognizing a problem

a. Asks questions about how and why things work

| | | |
|---|---|---|
| observes closely but doesn't ask questions | observes closely and asks some questions | incessantly asks many unusually penetrating questions; challenges explanations; asks about flaws in the way things work |
| ( ) | ( ) | ( ) |

b. Asks questions

| | | |
|---|---|---|
| Asks few questions | questions are typical of the age group | asks <u>many</u> questions, and more complex ones than agemates |
| ( ) | ( ) | ( ) |

2. Gathering and applying information

a. Sources of information and skills related to the physical sciences

| | | |
|---|---|---|
| classroom activities and materials are primary sources of information | uses schoolwide resources (classroom, teacher, other students, and school library) as primary sources of information | brings magazines and books from home; uses school and community libraries for sources; gets information from peers and older students after school; is involved with parents or other adults in activities related to this field. |
| ( ) | ( ) | ( ) |

b. Application of knowledge

| | | |
|---|---|---|
| responds well to paper/pencil tests but builds few things | responds well to paper/pencil tests of knowledge and comprehension and builds conventional things | responds very well to paper/pencil tests and easily applies knowledge and comprehension of mechanical things by fixing, maintaining, demonstrating or building intricate and complex mechanical things |
| ( ) | ( ) | ( ) |

c. Application of math skills and concepts

| | | |
|---|---|---|
| cannot apply math skills to the physical sciences | applies math skills to textbook problems in the physical sciences | can easily apply math skills to real world physical science problems |
| ( ) | ( ) | ( ) |

3. Analyzing data

a. Basic principles

| | | |
|---|---|---|
| doesn't understand the basic principles involved in activities in this field | can identify the basic principles involved but has trouble explaining them | can easily identify and explain the principles critical to processes and functions in the physical science and mechanical activities |
| ( ) | ( ) | ( ) |

b. Cause and effect relationships

| | | |
|---|---|---|
| doesn't understand the cause/effect relationships | understands cause/ effect relationships after they are pointed out | has rapid insight into the cause/effect relationships in the physical sciences and mechanical activities |
| ( ) | ( ) | ( ) |

c. Able to contrast and make comparisons

| | | |
|---|---|---|
| cannot make comparisons and contrast the various forces and actions involved | understands the comparisons and contrasts when they are pointed out | makes creative and unusual comparisons and contrasts to explain various forces and actions |
| ( ) | ( ) | ( ) |

d. Sequence

| | | |
|---|---|---|
| has a hard time with sequences of more than three actions | understands a sequence when it is pointed out | can easily figure out and explain the sequence of actions; is able to accurately predict sequences when confronted with a new application of principle |
| ( ) | ( ) | ( ) |

4. Problem definition

a. Considers societal values

| | | |
|---|---|---|
| does not recognize societal values | sometimes takes a value position | consistently considers the right and wrong, good and bad effects of products and processes in the field from the point of view of society at large |
| ( ) | ( ) | ( ) |

b. Relies on personal values

| | | |
|---|---|---|
| accepts the values of others rather than own | generally accepts textbook, teacher or "expert's" judgment of appropriate problem activities and products; sometimes designs his or her own version | does not accept teacher textbook, or other "expert" opinions and values without questioning; defines or redefines the problem in terms of his/her own value position |
| ( ) | ( ) | ( ) |

c. Tolerates ambiguity

| | | |
|---|---|---|
| makes judgments quickly; is uncomfortable with ambiguity | tends to make judgments quickly, often on the basis of limited information | able to defer judgment; is willing to "wait and see"; tolerates long periods of openness or ambiguity before seeking closure |
| ( ) | ( ) | ( ) |

d. Able to conceptualize

| | | |
|---|---|---|
| has difficulty conceptualizing a problem area | sometimes sketches or designs a model of a new "invention" or idea; usually relies on conventional ideas | can use two-and three-dimensional conceptualizations such as drawings and working models to depict new ideas, inventions and long-range problems |
| ( ) | ( ) | ( ) |

e. Takes risks

| | | |
|---|---|---|
| rarely will try something new or different | sometimes experiments with new or different ideas | is a high risk taker; tries out wild ideas just to see what happens |
| ( ) | ( ) | ( ) |

5. Generating ideas related to mechanical activities and the physical sciences

a. Is fluent

| | | |
|---|---|---|
| is not fluent: cannot express ideas verbally | is somewhat fluent: sometimes can verbalize ideas about ideas, events and processes | is fluent: easily expresses thoughts verbally about ideas, events, and processes in this field |
| ( ) | ( ) | ( ) |

b. Is inventive

| | | |
|---|---|---|
| is not inventive: cannot think of new ways to use old or standard tools, materials, equipment or processes | is somewhat inventive: can sometimes think of new ways to use old or standard tools, materials, equipment or processes | is very inventive: easily thinks of new ways to use old or standard tools, materials, equipment or processes |
| ( ) | ( ) | ( ) |

c. Is flexible

| | | |
|---|---|---|
| is not flexible: prefers to follow the traditional methods of problem solving | is somewhat flexible: can sometimes find new ways to solve problems; occasionally redesigns an experiment; basically prefers to replicate standard operations | is highly flexible: can think of new ways to solve problems related to this field; likes to redesign experiments and try to find other ways to do it |
| ( ) | ( ) | ( ) |

d. Is able to elaborate

| | | |
|---|---|---|
| elaborates poorly | designs realistic achievable possibilities | skillfully elaborates, "spins out" detailed possibilities |
| ( ) | ( ) | ( ) |

6. Selecting course(s) of action

a. Supports judgments with technical information

| | | |
|---|---|---|
| cannot support judgments with sufficient technical information | sometimes supports judgments effectively with sufficient technical information | consistently and effectively supports judgments with all technical information necessary |
| ( ) | ( ) | ( ) |

b. Supports judgments with data gained from personal experience

| | | |
|---|---|---|
| background experience in the physical sciences and mechanical activities is quite limited | relies somewhat on personal experience; has somewhat limited background of experience | relies heavily on extensive personal experience for judging right and wrong, good or bad effects of products and processes in this field |
| ( ) | ( ) | ( ) |

c. Seeks and accepts constructive criticism

| | | |
|---|---|---|
| sometimes seeks and accepts constructive criticism of his/her ideas and work | frequently seeks and accepts constructive criticism of his/her ideas and work | consistently seeks and accepts constructive criticism of his/her ideas and work |
| ( ) | ( ) | ( ) |

7. Implementation

a. Can plan and organize resources (time, energy, materials, facilities, money, etc.)

| | | |
|---|---|---|
| does not plan and organize resources | takes the time to plan and organize; uses written schedules and time tables, but rarely follows them; plans tend to be unrealistic in terms of resources | plans and organizes resources realistically and competently; skillfully juggles time and other resources to get many things done; uses fewer steps to get things done |
| ( ) | ( ) | ( ) |

b. Is flexible

| | | |
|---|---|---|
| becomes very upset with changes | tends to become upset with unforeseen events | incorporates unexpected or random events into plans and keeps working smoothly |
| ( ) | ( ) | ( ) |

c. Finishes projects

| | | |
|---|---|---|
| rarely finishes | frequently gets things done | is a "doer"; gets things done; can show the finished products |
| ( ) | ( ) | ( ) |

8. PRODUCT, PROCESS OR PERFORMANCE RATING (based on criteria established at the local level by educators and experts in the field)

| | fair | good | high | very high | exceptional |
|---|---|---|---|---|---|
| quality | ( ) | ( ) | ( ) | ( ) | ( ) |
| quantity | ( ) | ( ) | ( ) | ( ) | ( ) |
| innovativeness | ( ) | ( ) | ( ) | ( ) | ( ) |

DIRECTIONS: SCORING ITEMS 1-7:

1. Add the number of checks in each column.

2. Multiply the total by the "weight."

| | Number | | Weight | | |
|---|---|---|---|---|---|
| Items checked in the third column | _____ | X | 3 | = | _____ |
| Items checked in the second column | _____ | X | 2 | = | _____ |
| Items checked in the first column | _____ | X | 1 | = | _____ |

Weighted Column Total _____

3. Check appropriate column on the SUMMARY MATRIX: Subjective Data for number 2, Rating Scale: PF/S Skills, Items 1-7. The Weighted Column Total should be recorded for each rater.

DIRECTIONS: SCORING ITEM 8:

1. Add the number of items rated

| | | | | |
|---|---|---|---|---|
| exceptional | ____ | X | 10 | = ____ |
| very high | ____ | X | 8 | = ____ |
| high | ____ | X | 6 | = ____ |
| good | ____ | X | 4 | = ____ |
| fair | ____ | X | 2 | = ____ |

2. Multiply by the assigned weight.

Weighted Column Total ____

3. Check appropriate column for each rater on the SUMMARY MATRIX: Subjective Data Item 8, product, process or performance rating.

RATING SCALE: Personal Characteristics Student Number_____

ACADEMIC AREA: Physical Science/Mechanical Abilities Date_____

RATER:

DIRECTIONS: The following skills and characteristics should be rated as they apply to the student's behavior toward activities RELATED TO THIS FIELD. Please check (✓) the description which applies in most situations.

1. Motivation

| | | | | | |
|---|---|---|---|---|---|
| a. | Can work constructively and independently with close supervision during class projects ( ) | Can work constructively and independently if given directions and encouragement during class projects ( ) | Can work constructively and independently if given directions during class projects ( ) | Is enthusiastic and works independently; shows sustained interest for in-school projects ( ) | Is enthusiastic; shows sustained interest; carries school involvement to independent after-school activities and projects ( ) |
| | | | | | a* Rater <u>does not know</u> about after-school activities and projects (Please rate for inschool behavior even if you check this item) ( ) |
| b. | Rarely wants to excel ( ) | Sometimes wants to excel ( ) | Often wants to excel ( ) | Frequently wants to excel ( ) | Has tremendous and consistent desire to excel ( ) |
| c. | Gives up easily; will not try ( ) | Sometimes stops trying when problems arise ( ) | Often stops trying when problems arise ( ) | Frequently slows efforts if problems seem too great; seeks help ( ) | Does not let temporary defeats slow efforts; keeps trying even when facing great odds; uses resources for additional help ( ) |

2. Commitment of Resources (time, energy, materials, facilities, money, etc.)

| | | | | |
|---|---|---|---|---|
| a. Student does not use school or personal resources for activities and items related to this field | Student uses school or personal resources to a limited extent | Student uses some available school resources for activities related to this field | Uses available school resources to fullest extent possible | Student consistently uses his/her school and personal resources for activities and items related to this field |
| ( ) | ( ) | ( ) | ( ) | ( ) |

b* Rater does not know about after-school activities and projects (Please rate for inschool behavior even if you check this item)
( )

3. Energy (amount, duration, direction, and intensity)

| | | | | |
|---|---|---|---|---|
| a. Is generally lethargic | Is below average in amount and duration of energy | Has average amount and duration of energy | Has high energy level; can keep on after others stop; usually works faster than peers and does more | Has very high energy level; can keep going long after others stop for food or rest; is "recharged" quicker than most students; may be seen as "hyper;" works faster than peers and does more |
| ( ) | ( ) | ( ) | ( ) | ( ) |
| b. Is not task oriented | Is rarely task oriented | Is somewhat task oriented | Is frequently task oriented | Is very task oriented in this particular area |
| ( ) | ( ) | ( ) | ( ) | ( ) |

| | | | | |
|---|---|---|---|---|
| c. Never takes the initiative ( ) | Rarely takes the initiative ( ) | Sometimes takes the initiative ( ) | Frequently takes the initiative ( ) | Consistently takes the initiative ( ) |

4. Accepts Responsibility for Success and/or Failure

| | | | | |
|---|---|---|---|---|
| a. Believes that success or failure is controlled by luck; other people and events control one's successes and/or failures ( ) | Generally believes that a person has very limited control over success or failure ( ) | Believes that her/his personal efforts are responsible for success; failures are due to bad luck ( ) | Frequently explains success and/or defeats realistically in terms of his/her personal characteristics, capabilities, and actions; takes personal responsibility for the quality of his/her product or effort in positive ways ( ) | Consistently explains success and/or defeats realistically in terms of his/her personal characteristics, capabilities, and actions; takes personal responsibility for the quality of his/her product or effort in positive ways ( ) |

5. Can Plan, Organize, and Manage Resources

| | | | | |
|---|---|---|---|---|
| a. Does not have an objective clearly in mind; unaware of resources ( ) | Has not clearly defined a realistic objective has trouble planning and organizing resources ( ) | Has an objective in mind and sometimes can plan, organize, and manage resources ( ) | Has a specific objective clearly in mind; plans, organizes, and manages school resources to accomplish the objective ( ) | Has a specific objective clearly in mind; plans, organizes, and manages school and personal resources in ways that contribute highly to accomplishment of objective ( ) |

| | | | | | |
|---|---|---|---|---|---|
| b. | Does not consciously set goals; responds only to the immediate situation | Accepts others goals; does not design his/her own | Sets short-range but not long-range goals; short-range goals are not tied to long-range plans | Frequently sets realistic, achievable long-and short-range goals for achievement | Consistently sets realistic achievable long-and short-range goals for achievement |
| | ( ) | ( ) | ( ) | ( ) | ( ) |

6. Exercises Self-Control and Discipline

| | | | | | |
|---|---|---|---|---|---|
| a. | Is distractible; seldom sustains enough interest to finish project; has tantrums if things don't go her/his way | Puts off beginning a project; can resist anything but temptation; talks about finishing but usually gives up easily | Often begins immediately but loses interest in the project; has to finish in a big rush which sacrifices quality | Frequently begins immediately; sustains interest generally but has a hard time resisting temptations and distractions; finishes some projects | Able to consistently focus resources on tasks, perseveres; resists temptations and distractions; completes many projects of high quality; will not give up |
| | ( ) | ( ) | ( ) | ( ) | ( ) |

7. Self-Confidence (knows and accepts personal strengths, weaknesses, and limitations; believes in his/her own abilities; not afraid to ask for help; relies and builds on personal beliefs, knowledge, and experience; demonstrates or explains her/his work to others; not afraid to be the first to engage in an activity; talks comfortably with teachers and other adults as well as peers; is confident without being egotistical or arrogant)

| | | | | | |
|---|---|---|---|---|---|
| | Has very little self-confidence; exhibits negative behaviors | Has very little self-confidence; needs a lot of support | Has self-confidence sometimes, depending on the situation | Has self-confidence much of the time | Has self-confidence |
| | ( ) | ( ) | ( ) | ( ) | ( ) |
| A | ____ | ____ | ____ | ____ | ____ |
| B | X 1 | X 2 | X 3 | X 4 | X 5 |
| C | ____ + | ____ + | ____ + | ____ + | ____ |
| D | | | | | Total Score ____ |

DIRECTIONS FOR SCORING:

1. Add the items checked in each column of the entire scale. Summarize each column in Row A. (The maximum number for Row A is 12.)

2. Row B represents the weight for items summarized in Row A.

3. Multiply the number in Row A by the weight for that column given directly below in Row B. Put the results in Row C.

4. Add the numbers in Row C. Put the total in Row D, Total Score.

5. Transfer each rater's Total Score to the appropriate column on the Summary Matrix: Subjective Data, Personal Characteristics.

## INTERPRETING THE SUMMARY MATRICES

No single test, test score, or other measurement should be the sole determining factor in the identification of talented and/or gifted students. Assessment instruments must include both subjective and objective forms. The two summary matrices which follow have been designed to pull together objective and subjective assessment data into separate formats which can be analyzed. The two summary matrices serve the following purposes:

1. The data can be objectively analyzed.
2. Identified student strengths/weaknesses become a basis for programing.
3. Underachievers can be identified.
4. The matrices focus on subjective and objective information related only to the priority area.
5. Cutoff points can be readily established for each set of data.
6. Provides for use and analysis of instruments already part of the local testing program.
7. Analysis of data may suggest changes in the overall instructinal program.
8. Use of the two matrices ensures that decisions are based on analysis and interpretation of both subjective and objective data.

The Sample Summary Matrix: Subjective Data, used to record rating scale data related to fundamental skills and abilities, creative problem-finding/solving and personal characteristics uses both a point system and categories such as "above average" and "exceptionally high." These are arbitrary and non-standardized, and will need to be modified at the local level. Item four of the matrix, Other Subjective Measures, might include use of anecdotal records, autobiographies, case studies, teacher-made achievement tests and interviews. Appropriate point systems must be designed at the local level where these devices are used.

The last item on the Summary Matrice provides for a brief summary of the Student Self-Assessment Form. The selection committee should be referred to this form if it is seen as highly contributory in some way.

The Sample Summary Matrix: Objective Data, Circle A, Fundamental Skills and Abilities, is set up to correspond with the top, or fourth quartile of the normal curve. Percentiles are used as the basis for organizing the data. Scores which fall between 75% and 99% are in the fourth quartile as are stanines seven, eight, and nine. In other words, any test scores which can be placed on the summary matrix for objective data represent above average achievement or intelligence as measured by a given test. Despite the fact that the entire group may be considered mentally superior, it is a very heterogeneous group. The differences between students whose scores fall in Column Four and those whose scores fall in Column Five are highly significant and must be related closely to program design. Appropriate point systems must be designed for the matrix at the local level to record objective data gathered for Circles A and B of the model, Creative Problem-Finding/Solving and Personal Characteristics.

The Sample Summary Matrix: Subjective Data, used to record rating scale data related to fundamental skills and abilities, creative problem-finding/ solving and personal characteristics uses both a point system and categories such as "above average" and "exceptionally high." These are arbitrary and nonstandardized, and will need to be modified at the local level. Item Four of the matrix, other subjective measures, might include use of anecdotal records, autobiographies, case studies, teacher-made achievement tests and interviews. Appropriate point systems must be designed at the local level where these devices are used.

The last item on the Summary Matrix provides for a brief summary of the Student Self Assessment Form. The selection committee should be referred to this form if it is seen as highly contributory in some way.

These matrices are based on those developed by Dr. Alexinia Baldwin, State University of New York at Albany.

SAMPLE SUMMARY MATRIX: Subjective Data Student Number _____

ACADEMIC AREA: Physical Science/
Mechanical Ability

1. Rating Scale: Fundamental Skills and Abilities

Part One: Psychomotor

| | 26-28 | 29-31 | 32-34 | 35-37 | 38-40 |
|---|---|---|---|---|---|
| • Classroom teacher | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Special teacher | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Parent | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Other adult | ( ) | ( ) | ( ) | ( ) | ( ) |

Part Two: Communication Skills

• Classroom teacher

| | below average | average | average | average | exception-ally high |
|---|---|---|---|---|---|
| listening | ( ) | ( ) | ( ) | ( ) | ( ) |
| reading | ( ) | ( ) | ( ) | ( ) | ( ) |
| verbal | ( ) | ( ) | ( ) | ( ) | ( ) |
| written | ( ) | ( ) | ( ) | ( ) | ( ) |

• Other professional(s)

| | | | | | |
|---|---|---|---|---|---|
| listening | ( ) | ( ) | ( ) | ( ) | ( ) |
| reading | ( ) | ( ) | ( ) | ( ) | ( ) |
| verbal | ( ) | ( ) | ( ) | ( ) | ( ) |
| written | ( ) | ( ) | ( ) | ( ) | ( ) |

2. Rating Scale: PF/S Skills, Items 1-7

| | 33-40 | 41-48 | 49-56 | 57-64 | 65-72 |
|---|---|---|---|---|---|
| • Classroom teacher | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Special teacher | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Parent | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Other adult | ( ) | ( ) | ( ) | ( ) | ( ) |

Product, process, or performance rating, Item 8

| | 6-10 | 11-15 | 16-20 | 21-25 | 26-30 |
|---|---|---|---|---|---|
| • Teacher | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Panel | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Other adult | ( ) | ( ) | ( ) | ( ) | ( ) |

3. Rating Scale: Personal Characteristics

| | 36-40 | 41-45 | 46-50 | 51-55 | 56-60 |
|---|---|---|---|---|---|
| • Classroom teacher | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Special teacher | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Parent | ( ) | ( ) | ( ) | ( ) | ( ) |
| • Other adult | ( ) | ( ) | ( ) | ( ) | ( ) |

4. Other subjective measures
    - anecdotal records
    - autobiographies
    - case studies
    - teacher-made achievement tests
    - interviews

5. Summary of information from Student Self-Assessment Form

COMMENTS:

RECOMMENDATIONS:

SAMPLE SUMMARY MATRIX: Objective Data From Standardized Tests  Student Number_____

ACADEMIC AREA: Physical Science/ Mechanical Ability

A. Fundamental Skills and Abilities (Circle A)

| Tests and Dates Administered | Scores | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| *(name of test)* | 75-79% | 80-84% | 85-89% | 90-94% | 95-99% |
| 1. _____ Listening Skills Test _____ *(date taken)* | ( ) | ( ) | ( ) | ( ) | ( ) |
| 2. _____ Achievement Test: Science _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| 3. Item analysis of Science Section of Achievement Test (Physical Science items) _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| 4. _____ Achievement Test: Reading _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| 5. _____ Achievement Test: Math Comprehension | | | | | |
| _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| 6. _____ Achievement Test: Math Concepts/ Problem Solving _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| 7. _____ Group Intelligence test _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| 8. _____ Individual Intelligence test _____ | ( ) | ( ) | ( ) | ( ) | ( ) |
| 9. _____ Aptitude test | ( ) | ( ) | ( ) | ( ) | ( ) |

B. Creative Problem Finding/Solving (Circle B)

| Tests and Dates Administered | | Scores | | | | |
|---|---|---|---|---|---|---|
| 1. _____ | Creativity test | ( ) | ( ) | ( ) | ( ) | ( ) |
| 2. _____ | Proficiency/performance test | ( ) | ( ) | ( ) | ( ) | ( ) |

C. Personal Characteristics (Circle C)

| Tests and Dates Administered | | | | | | |
|---|---|---|---|---|---|---|
| 1. _____ | Self-Concept Scale | ( ) | ( ) | ( ) | ( ) | ( ) |
| 2. _____ | Personality Questionnaire | ( ) | ( ) | ( ) | ( ) | ( ) |
| 3. _____ | Motivation Inventory | ( ) | ( ) | ( ) | ( ) | ( ) |
| 4. _____ | Attitude Test | ( ) | ( ) | ( ) | ( ) | ( ) |

Comments:

Recommendations: